

Total Eclipse of the Sun, 1894 September 29.

*Extract from the Meteorological Log (9,399) kept on board the SS.
"Yarrawonga." By Captain H. G. Thomas.*

(Communicated by the Secretaries.)

This eclipse was looked for on the morning of the 29th, but we were unable for clouds to note the time of first contact. As we were to the northward of the line of central shadow, it was observed by us as a partial eclipse. The central phase took place at 9.20 A.M., corresponding to G.M.T. $28^{\text{d}} 16^{\text{h}} 31^{\text{m}} 42^{\text{s}}$, the Sun's diameter being about $\frac{3}{4}$ hidden, disclosing a crescent at the underneath part. The sky keeping clear, the eclipse was observed to finish at 10.57 A.M., corresponding to G.M.T. $28^{\text{d}} 18^{\text{h}} 8^{\text{m}} 42^{\text{s}}$. Position of ship at central phase—Lat. $7^{\circ} 17' \text{ S.}$, Long. $70^{\circ} 12' \text{ E.}$ Position of ship at finish—Lat. $7^{\circ} 6' \text{ S.}$, Long. $69^{\circ} 58' \text{ E.}$

Meteorological Office :

1894 November 8.

*Observations of the Transit of Mercury on 1894 November 10 at
Sidmouth, Devon. By A. F. Lindemann.*

1. The observations were made on Muttersmoor, about 630 feet above sea, near Sidmouth, in N.L. $50^{\circ} 41' 28''$ and W.L. $3^{\circ} 16' 2''$, by Professor H. H. Turner, of Oxford, and A. F. Lindemann, of Sidmouth.

2. *Instruments.*—Professor Turner : Refractor by W. Wray, aperture 3.04 inches, focal length 40 inches, magnifying power 155, measured by observations on a graduated staff at noon, November 11. Eye-piece pulled out and image thrown on card screen firmly attached to telescope by wooden bars, so as to give an image of the Sun 3 inches in diameter. (It was intended to have this image 6 inches in diameter, but in the hurry of putting up the instrument after the shower mentioned below the wooden bars were attached too far up the telescope tube, and could not be altered in time. A black cloth was used to shut out stray light, and the observations were found very easy.)

A. F. Lindemann : Refractor by T. Cooke & Sons, 2.44 inches free aperture, 37 inches focal length. Eye-piece magnifying power 55, similarly determined on November 11.

3. *Watches.*—The pocket watches of the party were used and were compared as follows, being denoted by the following initials :—

- (1) Miss Dora Davidson's watch, D.D.
- (2) Professor Turner's watch, H.T.
- (3) A. F. Lindemann's watch, L.

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the Transit of Mercury.

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D.D.	H.T.	D.D.—H.T.	Date.
h m s	h m s	s	
3 21 0	3 20 53.8	+ 6.2	Nov. 10
5 11 20	5 11 15	+ 5.0	10
10 56 30	10 56 28	+ 2.0	10
4 52 30	4 53 1.5	—31.5	11

L.	H.T.	L.—H.T.	Date.
h m s	h m s	m s	
3 22 0 p.m.	3 20 10	+1 50	Nov. 10
4 32 30	4 30 38	+1 52	10
5 43 0	5 41 6.7	+1 53.3	10
10 40 0	10 37 51.7	+2 8.3	10
4 36 30	4 34 16.8	+2 13.2	11

4. Comparison with Sidereal Clock (T. Cooke & Sons) at Sidholme Observatory :—

$$\begin{aligned} \text{H.T.} &= 5^{\text{h}} 38^{\text{m}} 43.7^{\text{s}} = 20^{\text{h}} 54^{\text{m}} 0.0^{\text{s}} \text{ Cooke} \\ \text{L.} &= 5^{\text{h}} 42^{\text{m}} 37.0^{\text{s}} = 20^{\text{h}} 56^{\text{m}} 0.0^{\text{s}} \quad ,, \end{aligned}$$

5. *Error of Sidereal Clock.*—Three stars (α Cephei, β Aquarii and ϵ Pegasi, one N. and two S. of the zenith) were observed with the Sidholme transit, and gave a clock error of $7^{\text{m}} 23^{\text{s}}.0$ (fast) at $21^{\text{h}} 30^{\text{m}}$ sidereal on November 10. From further observations on November $12^{\text{d}} 1^{\text{h}}$ (sid.) the clock was found to be $7^{\text{m}} 51^{\text{s}}.2$ fast, giving a rate of $0^{\text{s}}.57$ per hour gaining.

6. *Error of Watches on G.M.T.*—From the above comparisons and observations the errors and rates of the watches at the time of observation were found to be—

$$\begin{aligned} \text{D.D.} & \quad 1^{\text{m}} 18.2^{\text{s}} \text{ slow, losing } 0.21^{\text{s}} \text{ per hour.} \\ \text{H.T.} & \quad 1^{\text{m}} 23.7^{\text{s}} \quad ,, \quad ,, \quad 0.07^{\text{s}} \quad ,, \\ \text{L.} & \quad 0^{\text{m}} 28.6^{\text{s}} \text{ fast, gaining } 0.57^{\text{s}} \quad ,, \end{aligned}$$

7. *Observations of Ingress.*—Arrived at observing-station at $2^{\text{h}} 42^{\text{m}}$ G.M.T., $2^{\text{h}} 52^{\text{m}}$ quite overcast, $3^{\text{h}} 8^{\text{m}}$ raining hard, but clearing in W. The party sheltered in the carriage and compared watches as in §3. About $3^{\text{h}} 30^{\text{m}}$ cleared up and instruments quickly erected; all ready and quite clear at $3^{\text{h}} 49^{\text{m}}$.

Professor Turner's observation by watch D.D. (time taken by Miss Dora Davidson) :—

D.D.	h m s		G.M.T.	h m s
	3 55 0	"slight cloud."		3 56 18.2
	3 55 30	"Mercury suspected."		3 56 48.2
	3 56 44.5	"first thread of light."		3 58 2.7

10 seconds later well separated.

A. F. Lindemann observed internal contact by

	^h	^m	^s
L.'s watch at	3	58	15
Watch error			-28.6
G.M.T. =	3	57	46.4

15 seconds later separation quite distinct ; 4^h 10^m G.M.T. quite cloudy.

The white spot was not seen, although looked for directly, without success, by both observers.

On the late Transit of Mercury. By the Rev. S. J. Johnson, M.A.

November 10 was mild here, with frequent showers, one of which ended too slowly at the time of ingress, when the Sun came out at 3^h 58^m 12^s. The internal contact of *Mercury* with the Sun seemed to have taken place hardly more than 5 seconds. This would be later than the predicted time by about $\frac{3}{4}$ minute. The disc of the planet was jet black. It seemed to resemble a shot on a bright background. No halo was perceptible, though it was carefully looked for. By way of trial, I took some micrometer measurements of diameter, the mean of which came out 8''·8 ; quite as near as could be expected, considering the Sun's limb was boiling and the planet very tremulous. The transit was visible for exactly twenty minutes, when the Sun disappeared behind a small black cloud. No power higher than 50 on a 3 $\frac{1}{4}$ -inch telescope could be employed.

Melplash Vicarage, Bridport :
December 8.

Observations of the Transit of Mercury, 1894 November 10, made at Grahamstown, Cape of Good Hope. By L. A. Eddie.

The sky was clear in the vicinity of the Sun as the moment approached for external contact at ingress, though there were many light clouds in the east, and lateral strata of fine cirri clouds lying on the western horizon and extending to a little below the position of the Sun. The air was warm and calm, but a low barometer bespoke that a change was at hand, which was already indicated by an unsteady condition of the atmosphere around the Sun's periphery, causing a constant succession of rapid undulations, which I feared would intercept the detection of external contact. There were seven conspicuous sun-spots on the solar disc, in three groups of two spots each and one single one just within the western border. The instrument used was a 3-inch refractor, powers 32 and 120.